The Saffir/Simpson Hurricane Scale:

An Interview with Dr. Robert Simpson

Debi Iacovelli
Tropical Weather Specialist
Cape Coral, Florida

Editor's Note: The Saffir/Simpson Hurricane Scale was first proposed in 1971 by Robert Simpson and Herbert Saffir, and is now widely used. This interview was conducted in 1991.

"Hurricane Hugo is now a Category 4 on the Saffir/Simpson Scale..." We hear the expression so often during the hurricane season, the "Saffir/Simpson Scale." But where did it originate and who was the creator of it? In this exclusive interview, Dr. Robert Simpson gives us some background about the scale and his personal feelings on the way it has been used in the discussion of hurricanes.

Space will not permit me to do justice to the lengthy career of Dr. Robert Simpson. He and his wife, Dr. Joanne Simpson, are both fellows of the American Meteorological Society. He is a former director of the National Hurricane Center (1967-1974) and is an accomplished writer of tropical meteorological books and articles. In 1991 he was awarded the "Cleveland Abbe Award for distinguished Service to Atmospheric Sciences by an Individual" for "pioneering work in storm research and for outstanding leadership in planning and implementing complex operational programs over a span of decades." He now operates a consulting meteorological firm in Charlottesville, Virginia, called "Simpson Weather Associates, Inc." Needless to say, Dr. Simpson and his wife are truly among the pioneers in hurricane research.

DI: When did you first start working with hurricanes, Dr. Simpson?

RS: I got interested in hurricanes ever since I almost drowned in one in Corpus Christy (Texas) in 1919, but my first actual flight into a hurricane was in 1945. And then I flew with the Air Force in their early reconnaissances from 1945 through 1954 as a guest to get research data after they got their operational data. Based upon that then, when we were able to get the money in 1954 to establish a full-time, around the year, research on hurricanes, I was asked to be the first director of it. We established that at West Palm Beach, Florida. We had three planes dedicated to research there, and by the Air Force, but they only did our hurricane research for us, we didn't get any operational information, just research. So that was the beginning of organized hurricane research itself. A lot of

Continued on Page 11

The Saffir/Simpson Scale

Continued from Page 10

people, both on the outside, in Universities as well as from within the Weather Services and NOAA, participated in the research, both on the data we got on the aircraft, and theoretical research.

DI: Dr. Simpson, why don't you give us a bit of background on the development of the Saffir/ Simpson hurricane scale?

RS: The problem of evacuating people and getting warnings out that are understood and which will evoke a response in the people who need to move has always been a difficult one. When I first came down to the Hurricane Center in 1967, I tried to come to grips with how we could do a better job of communicating. And that's very difficult; scientists communicate with each other very easily, but a scientist trying to communicate with a person who is a non-scientist on a technical problem is very difficult at times.

So it occurred to me if we could find some means of expressing the gradations of risks that people have in a hurricane, it would help people like the American Red Cross and the Emergency Management people to decide how best to make their decisions and to deal with the people they were responsible to. So I was talking to Herb Saffir (in 1968) about work that he had been doing and had just completed for the United Nations. He had completed something in the way of a summary of what you could expect in the way of ornamental damage and basic damage to structures with winds of different strengths. I said this is probably, put in a different suit of clothing, exactly the type of thing we need but we'll have to add the storm surge to it and a few other things. So I took on the job of working with him to get this thing put up in a new suit of clothing that we could then distribute to people, like the American Red Cross, who have to provide disaster relief when it's all over.

It was used that way for a couple of years before I left the Hurricane Center in 1974. Then the year after that when Neil Frank became the director, the pressure was put on him to distribute this to the public. I often felt that it was a little bit premature to put the scale out without perhaps improving it a little bit, and at least educating the people as to what it meant a little bit more. But politics and the situation was such that when people want something they want something, they're going to get it whether they know how to use it or not. So, I think that through the years it served a very good purpose for a lot of people. It's been misinterpreted, misused in a lot of places, but almost any device which is technical is. And the main difference in making it a equally useful thing to everybody is education, and telling them what it amounts to.

The scale as devised, expresses what the extreme conditions can be expected from a hurricane of a certain type and a certain category. It doesn't mean that everyone that a hurricane moves over, and the worst part of that hurricane, is going to receive that kind of damage or that kind of hazard. In other words, it's a study in probabilities—the probability of being hurt. And why is that? It's a great big storm, why isn't there a uniform amount of damage that you get? And if you've ever surveyed damage after a hurricane you know that one block of houses may be almost totally destroyed, and two blocks to either side there will be little damage at all.

It's almost like a tornado. It's not a tornado, but what is happening is it's not a uniform bowl of pudding that's circulating around here. It's something that has lots of streaks in it, and the streaks are made by the cumulus clouds that are embedded in this great big storm. And as these cumulus clouds circulate around, they're relatively small. Some of them are no more than a couple of kilometers across and maybe four of five kilometers long. That means that just a few blocks to one side or to the other side of where this cumulus cloud is providing the extreme wind, you have much less than the extreme, and therefore get no damage at all that's comparable on either side of it. So, there's several problems. The problem is first, expressing to the people who have to leave that it's a matter of probabilities, but if they don't believe that they're going to be in the worst sector and receive the worst damage or hazard, then they're playing Russian Roulette. They have to assume the worst and act accord-

Continued on Page 12

The Saffir/Simpson Scale

Continued from Page 11

ingly. Others are engineers who brag about the fact that the house or building that they engineered received no damage, and another engineer whose building received a lot of damage tries to explain why it did, because he knows he engineered it right. There isn't that understanding, and it's difficult to understand that it's the difference in the hurricane, not the difference in the engineering that caused the difference in the amount of damage received.

DI: Dr. Simpson, in your opinion, since the Saffir/Simpson scale is an open ended scale, do you think that hurricane windspeeds could become a category 6 or 7?

RS: I think it's immaterial. Because when you get up into winds in excess of 155 miles per hour you have enough damage if that extreme wind sustains itself for as much as six seconds on a building it's going to cause rupturing damages that are serious no matter how well it's engineered. It may only blow the windows out, but on the other hand, it can actually rupture the stairwells, the elevator wells and twist them, and it's happened in many buildings so that you can't even use the elevators after they've experienced this. So I think that it's immaterial what will happen with winds stronger than 156 miles per hour. That's the reason why we didn't try to go any higher than that anyway.⚓

Saffir/Simpson Hurricane Scale*

Category	Definition/Likely Effects
ONE	**Winds 75-95 mph (65-82 kts)**: No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal flooding and minor pier damage.
TWO	**Winds 96-110 mph (83-95 kts)**: Some roofing material, door, and window damage of buildings. Considerable damage to vegetation, mobile homes, etc. Flooding damages piers and small craft in unprotected anchorages break moorings.
THREE	**Winds 111-130 mph (96-113 kts)**: Some structural damage to small residences and utility buildings with a minor amount of curtainwall failures. Mobile homes are destroyed. Flooding near the coast destroys small structures with larger structures damaged by floating debris. Terrain may be flooded well inland.
FOUR	**Winds 131-155 mph (114-135 kts)**: More extensive curtainwall failures with some complete roof structure failure on small residences. Major erosion of beach areas. Terrain may be flooded well inland.
FIVE	**Winds greater than 155 mph (greater than 135 kts)**: Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Flooding causes major damage to lower floors of all structures near the shoreline. Massive evacuation of residential areas may be required.

NOTE: A "major" hurricane is one that is classified as a Category 3 or higher.

* In operational use, the scale corresponds to the one-minute average sustained wind speed as opposed to gusts which could be 20 percent higher or more.